THE PREVALENCE OF NUTRITION MISCONCEPTIONS AMONG ADOLESCENT FEMALES IN OKLAHOMA

By

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INTRODUCTION

Adolescence is a time of rapid growth and development during which the teenager is advancing from childhood to adulthood. At this time individuals are attempting to assert themselves as maturing persons. The period known as early adolescence is marked by rapid physical growth; sexual maturation; and changes in interests, attitudes, and emotional responses. As a result, this is a period of physiological, psychological, emotional, and social stress in the development of the adolescent. This is particularly true for the adolescent girl. Her preoccupation with her appearance may lead to eating behaviors unfavorable to her health and development. This concern about her physical development and attractiveness combined with a lack of nutrition knowledge makes her part of one of the more vulnerable segments of the population. In an attempt to express her independence or influence her physical appearance, the teenage girl may change her diet based on erroneous beliefs or misconceptions that could pose a danger to her health.

The prevalence of misinformation about nutrition and food is an increasingly serious situation. Misconceptions held by adolescent girls can interfere with their learning of sound nutrition information unless nutrition education is based on information to combat these misconceptions.

Purpose and Objective

The purpose of this study was to determine the prevalence of certain nutrition misconceptions among adolescent females in the central section of Oklahoma, who volunteered for a nutrition study. The specific objective was to determine any differences in the mean misconception scores of different races, grade levels, income levels of the families, mothers' education levels, and rural or urban background.

Hypotheses

The following null hyotheses were tested:

H_1: There will be no significant difference in the mean misconception scores among grade levels.

H_2: There will be no significant difference between the mean scores of whites and blacks.

H_3: There will be no significant difference in the mean scores of girls from urban areas and girls from rural areas.

H_4: There will be no relationship of the mean scores of girls to per capita income or mother's education level.

Assumptions

The researcher assumed:

1. The sample size was sufficient to obtain valid data.
2. All responses were made voluntarily and truthfully by the respondents.

Limitations

Responses were limited by the adequacy of the instrument and the understanding of the instrument by the respondents. The sample was limited to those girls who volunteered for a regional nutrition study.

Definitions

The following definitions were used in this study.

1. Adolescent female: a female who was between 11.5 and 16.5 years of age on March 1, 1981.
2. Misconception: a belief commonly held as true but which is not in accord with scientific evidence to date (Wodarski, 1976).
3. Rural: place of residence outside of town or in towns of fewer than 2500 people.
4. Urban: place of residence with greater than or equal to 2500 people.

CHAPTER II

REVIEW OF LITERATURE

The teenage years, particularly for girls, can be a very emotional, stressful time. The needs and problems in the teenager's world are very complex. The transition period from childhood to adulthood has been progressively shortened into fewer and fewer years, creating the current demand for "instant adulthood" (Leverton, 1968). During this span of time, teenagers are inclined to develop poor eating habits that may affect their future health and the health of their future families (Howe and Vaden, 1980). This is especially true for the adolescent girl. Her concern about her physical development, attractiveness, complexion, and social acceptance among her peers, leads to emotional stress that may adversely affect her nutrition through food selection and metabolism (Everson, 1960; Hinton et al., 1963).

Dietary Adequacy and Nutritional Status

Adolescent girls are said to have the least adequate diet of any population group. A Nutrition Education Needs Assessment study done in Oklahoma in 1979 (Baird, 1979) analyzed 24-hour dietary recalls by two diet patterns which were designated as adequate diet: Basic Four and Basic Four plus vitamins A and C, the latter being diets which included fruit and vegetable sources high in vitamins A and C. To allow for forgetfulness on the part of the students, the following liberal

interpretation of the Basic Four food groups was used:

milk	3 or more servings/day
fruit and vegetables	3 or more servings/day
bread and cereals	3 or more servings/day
meat	2 or more servings/day

The study revealed that only 21.4 percent of girls in grades 7-9 had diets that met the Basic Four by these guidelines and only 11.5 percent of girls in grades 10-12 had adequate diets on this same basis. When vitamins A and C were considered along with the liberal interpretation of the Basic Four food groups, the proportion of girls receiving adequate diets decreased to 11.8 percent and 5.6 percent, respectively.

As part of the same study, Gregory (1982) examined the dietary behavior of 3,798 Oklahoma adolescents (boys and girls) in grades 7-9 and grades 10-12. Her sample contained 1,037 girls in grades 7-9 and 858 girls in grades 10-12. For these students, the number and choice of the Basic Four food groups provided by each meal and snacks were analyzed. Results showed that 23.9 percent of the girls in grades 7-9 and 36.5 percent of the girls in grades 10-12 had no food group item at breakfast. Over two-thirds of the girls in grades 7-9 and over three-fourths of the girls in grades 10-12 ate food from two or fewer food groups at breakfast. No food group item appeared in the lunches of 10.1 percent of 7-9 grade girls and 13.9 percent of 10-12 grade girls. Two or fewer food group items were eaten for lunch by 41.7 percent of seventh through ninth graders and 48.3 percent of tenth through twelfth graders. Findings indicated that more boys than girls in both age groups ate a more varied diet at breakfast and lunch, and more girls than boys in grades 10-12 skipped meals and omitted all food groups at breakfast.

In a study comparing the diets of teenage participants of the School Lunch Program and nonparticipants, investigators found that 75.8 percent of female nonparticipants had poor diets compared with 42.1 percent of female participants (Howe and Vaden, 1980).

Schorr et al. (1972) found 21 percent of teenagers studied consumed less than two-thirds of the 1968 Recommended Dietary Allowance (RDA) for ascorbic acid (equivalent to 55 percent of the 1980 RDA), 44 percent consumed less than two-thirds of the 1968 RDA for calcium (72 percent of the 1980 RDA). Fifty-one percent received less than two-thirds of the 1968 RDA for vitamin A (equivalent to 83 percent of the 1980 RDA for girls and the same for boys) and 69 percent received less than two-thirds of the RDA for iron.

Haider and Wheeler (1980) assessed and compared the nutrient intakes of 150 teenage girls in black and Hispanic families of low socioeconomic status. Mean iron intakes of all teenagers were approximately 50 percent below the Recommended Dietary Allowance and mean calcium intakes ranged from 33 to 78 percent of the RDA for all girls and were approximately 50 percent below the RDA for girls 13-18 years of age. However, vitamin A intakes were at or higher than the recommended level and ascorbic acid intakes were considerably higher than the RDA for teenagers of both ethnic groups.

Preliminary findings of the First Health and Nutrition Examination Survey (1974) provided evidence of iron deficiency, with some anemia, for adolescents, based on a relatively high percentage of low transferrin saturation values. In the 12-17 year age group, the percentage of low values for hemoglobin and hematocrit was four to six times higher in blacks than in whites, regardless of income. Mean intakes of iron were 23 to 33 percent below the standard for 12-17 years of age.

Gregor et al. (1978) studied the iron, copper, and zinc status of 178 sixth, seventh, and eighth grade girls in Indiana. Over one-half of the girls consumed less than two-thirds of the Recommended Dietary Allowance for iron while over one-third consumed less than two-thirds of the RDA for zinc. Only four percent of the girls had low serum copper levels.

Meal Skipping and Weight Control

Meal skipping and snacking are characteristics of many teenage girls, with failure to maintain normal weight a frequent problem (Baird, 1979; Hinton et al., 1963; Leverton, 1968; Edwards et al., 1964; Thomas and Call, 1973). According to MacReynolds (1970), many adolescents gain 50 to 100 extra pounds by 13 to 16 years of age. In a survey by Dwyer et al. (1967), 15.2 percent of 446 teenage girls were obese, based on triceps, skinfold measurements, and 61.4 percent reported they had dieted to lose weight at some point in their lives. Thirty-seven percent of the girls reported being on a diet at the time of the survey. Attempts to avoid or lose excess body fat significantly affect the adolescent girl's food choices. Eating snacks instead of usual meals is a growing trend, with snack foods determined more by availability than by nutritional value (Bowden, 1973).

Thomas and Call (1973) evaluated the between meal snacks reported by adolescents who participated in the Ten State Nutrition Survey. Seventy-eight percent of the teenagers in the Ten State Nutrition Survey reported eating between meals on the day of the 24-hour recall. Eating between usual meals provided calories and some nutrients to help meet the nutrient needs for the adolescent group, but some dietary problems

were indicated, especially with regard to calcium and iron. Baird (1979) found that it was more common for girls than boys at all grade levels to skip breakfast, and breakfasts eaten decreased as grade level increased. Forty-four percent of Oklahoma girls in grades 10-12 reported skipping breakfast, and 16 percent skipped lunch.

Pregnancy

Pregnancy during the teenage years is steadily on the rise. Each year about one million teenagers age 15-19 become pregnant (Finkelstein, 1981). The main reason why high school girls have dropped out of school in the United States has been pregnancy (MacReynolds, 1970). Wiegley (1975) reported suboptimal food intakes were common among pregnant adolescents, adding a great burden to the nutritional status of the girl and her unborn child. Very young mothers frequently have such maternal complications as toxemia, prolonged or precipitated labor, postpartum infection, and hemorrhage. Low infant birthweight, increased birth defects, and high infant mortality rate are also associated with teenage pregnancies.

Nutrition Knowledge Studies

In spite of her need for proper nutrition, little interest or desire to learn about or to improve her nutrition has been expressed by the adolescent (Wodarski, 1976). Osman (1972) pointed out that nutrition was the lowest ranking area of knowledge on the School Health Education Study for twelfth grade students who had received nutrition education from kindergarten through senior high. Teenagers in Tennessee also possessed low levels of nutrition knowledge and maintained many

misconceptions in the area of foods and nutrition in spite of a high emphasis on nutrition education in the school systems (Wodarski, 1976). Schwartz (1975) found that young women who had previously had a unit in food in a home economics class did not apply their knowlege of nutrition in their food choices. In an urban area of Massachusetts, 1,338 high school students were surveyed by Dwyer et al. (1970). Most students reported nutrition to be equally or less interesting than other parts of the health education courses they had taken. A nutrition knowledge test administered to these students showed that girls scored higher than boys overall, but lower on areas dealing with weight loss and gain, energy metabolism, and energy output.

Parks (1977) determined the effects of nutrition education on the nutrition knowledge and food preferenes of adolescent girls and boys enrolled in a Dallas, Texas, high school. A 12-week course in foods and nutrition was given to 65 students. Pre- and post-test scores on a food preference list showed that the course accomplished no significant changes in food preferences of the students. The study indicated that either the period of time allotted to the foods and nutrition course or the teaching approach was not effective in accomplishing significant changes in food preferences.

Misconception Studies

From an educational perspective, it is important to attempt to identify those factors that influence the level of nutrition knowledge. In addition to low motivation for learning due to lack of interest in foods and nutrition, low performance on nutrition knowledge tests could be due to the prevalence of misconceptions in this area (Wodarski,

1976). Some investigators have reported nutrition misconceptions common among adolescents and youths and have suggested that these pose a potentially serious threat when decisions influencing health are based on such misconceptions (Dzenowagis et al., 1954; Dzenowagis and Irwin, 1954; Harrison and Irwin, 1964; Wodarski, 1976).

Dzenowagis et al. (1954) studied the health and safety misconceptions of 250 tenth grade girls in a Massachusetts city. In this study, 25 percent or more of the girls subscribed to 111 of 126 misconceptions. The misconceptions held in the area of nutrition were not scored separately but nearly 7 of 10 of the girls believed that "any food that does not smell or taste spoiled is safe to eat." More than half of the girls believed that "taking vitamin pills will guarantee you good health," and half of these same girls believed that "vitamins in certain pills are better than vitamin in natural foods." One of every two girls believed that "persons can clean their blood by eating certain foods."

Dzenowagis and Irwin (1954) repeated the above study with 2,210 fifth graders and 1,881 sixth graders as the subjects. Many harmful health and safety misconceptions, with several being in the area of nutrition, were subscribed to by these children. Seventy-five percent believed that "taking vitamin pills will guarantee you good health" with 65 percent believing that "taking vitamin pills is the best way to get your necessary vitamins." Other misconceptions included the beliefs that "a daily bowel movement is always necessary for good health" (64 percent agreed), "the only way to lose weight is by exercising" (59 percent agreed), "eating between meals causes most children to have poor health" (55 percent agreed), "any food that does not smell or taste spoiled is safe to eat" (63 percent agreed), and "persons can clean their blood by eating certain foods" (50 percent agreed).

Harrison and Irwin (1964) found that students in seventh, eighth, and ninth grades in two metropolitan areas of the United States subscribed to many harmful health misconceptions, regardless of the metropolitan area, sex, grade level, or number of semesters of health instruction. They compiled 140 health misconceptions, 25 of which were in the area of nutrition. The 140 health misconceptions were divided into two 70-item tests. Their sample was 1,215 students who responded to either one of the two health misconceptions tests. Ten percent or more of the total sample subscribed to 67 of the 70 misconceptions from Form A, and to 56 of the 70 misconceptions from Form B. The percentage of the total sample subscribing to each misconception for Form A ranged from 4 to 86 percent, and from 5 to 69 percent for Form B. The area of nutrition was not scored separately but the question most frequently missed on the test was in this area. The question, "a daily bowel movement is always necessary for good health" was missed by 86 percent of the students, followed by 80 percent missing the question, "milk is a perfect food."

One hundred and eighty-five tenth and twelfth grade students in Knoxville, Tennessee, were studied to assess their food and nutrition misconceptions, food and nutrition-related interests, and information sources (Wodarski, 1976). Students of both sexes and all grade levels possessed a limited knowledge of food and nutrition and subscribed to numerous misconceptions. The greatest proportion of misconceptions was found in the areas of "Food My Body Needs" (33.5 percent misconceptions) and "Diet and Weight Watching" (32.1 percent misconceptions). No significant difference was found between grade levels.

Cornely et al. (1963) studied 310 black and 98 white families to determine cultural factors among low-income families that affect health

knowledge, habits, and nutritional beliefs. The study revealed that both blacks and whites retained faith in a number of nutrition misconceptions. These included the beliefs that "fish is a brain food" (42.9 percent agreed), "raw eggs are more easily digested than cooked ones" (44.5 percent agreed), "frozen foods are not as nutritious as fresh foods" (69 percent agreed), "canned food should be removed from the can immediately after the can is opened" (86.5 percent agreed), "people with too much acid in their blood should not eat citrus fruits" (76.8 percent agreed), and "one should feed a cold and starve a fever," with which 55.5 percent of the respondents agreed. Such personal characteristics as age, education, and prior residence influenced the likelihood of subscription to these misconceptions.

Synovitz (1960) determined the amount and kind of harmful health misconceptions believed by 630 students enrolled in basic health information classes in four-year colleges in Indiana. He found significant differences in the mean harmful misconception scores for several subgroups of the sample. Females had a higher mean misconception score than males, blacks' mean misconception score was higher than whites', and single students subscribed to more harmful health misconceptions than married students. There was no difference between the mean scores of students from rural and urban backgrounds. The mean misconception score for the sample in the area of nutrition was 15 percent.

Two hundred and seventy-four first year students at a Canadian university had a substantial number of nutrition misconceptions (McCarthy and Sabry, 1973). The mean misconception score on a 70-item, "true"-"false"-"don't know" questionnaire was 26.6 percent; the mean correct score was 54 percent, and the mean "don't know" score was 19.4 percent.

Little difference was seen in the scores related to rural or urban background of the students.

Nutrition Education

The prevalence of nutrition misconceptions should be of concern to all nutrition educators. By knowing what fallacies and half-truths are believed by the adolescent girl, nutrition educators can use this information as a basis for curriculum development. In addition to the elimination and correction of the misinformation, this may also be an opportunity to create more or new interest in nutrition through discussion of information the girl thinks she already knows about nutrition and foods. In planning nutrition education programs for adolescents, it is essential that motivating factors, pertinent topics for nutrition education, and problem areas through which to inspire interest in the teenager be explored.

A study done by MacKenzie and Arbor (1979) used a concept known as cross-age teaching as the driving force to motivate adolescents to learn basic nutrition information. In their study, the experimental group devoted 4 of 12 nutrition lessons to planning and teaching the material to elementary school children or older adults. The control group used these four lessons as a review. Pre- and post-test scores determined that the experimental group learned and retained nutrition knowledge more effectively than the control group.

Wodarski et al. (1980) developed a teaching device known as Teams-Games-Tournaments (TGT). When TGT is used, all students have an equal opportunity to succeed since each student competes against members of other teams who are at similar achievement levels and since any points

earned contribute to the team effort. Significant increases in nutrition knowledge have been measured in students who have participated in TGT and students have indicated that they enjoyed the TGT technique for learning nutrition.

The effectiveness of the mass media in teaching nutrition to teenagers has been tested. When the mass media were used, nutrition knowledge increased, especially if audience involvement was included (Axelson and Del Campo, 1978; Brent, 1974).

The primary nutrition education implication for adolescents is nutrition education programs that are tailor-made for this age group. Studies have shown that health and nutrition education classes have generally not been successful in altering the number of nutrition misconceptions held by teenagers (Harrison and Irwin, 1964; Schwartz, 1974; Wodarski, 1976; Johnson and Hart, 1977).

Osman (1972) offers six suggestions for teenage nutrition education:

1. Motivation of the student through meaningful involvement.
2. The reduction of proactive inhibition by the identification and elimination of nutrition misconceptions.
3. The importance of organization of information taught.
4. Increasing the "meaning-value" of information taught.
5. Limiting the quantity of information taught.
6. The importance of adequate repetition and appropriate reinforcement in memory recall.

To increase the nutrition knowledge of adolescents, educational programs should concentrate on ideas and misconceptions adolescents already have about nutrition and should put emphasis on areas of problems and interests.

Summary

This review of literature indicated that many adolescent girls have or will develop poor or less than adequate dietary patterns. One of the reasons this happens is that in an attempt to manipulate their physical appearance, they may turn to misconceptions about dieting and nutrition. When their food choices are based on such misinformation, a threat to the health of these girls may be imposed. The intent of this study was to identify the prevalence of certain nutrition misconceptions among a sample of adolescent girls in Oklahoma.

CHAPTER III

METHODS AND PROCEDURES

The general pattern of previous misconception studies has been essentially that of (1) validating an instrument comprised predominantly of false statements, (2) administering this instrument to a select group, (3) scoring the results to obtain a misconception response, and (4) reporting in various ways the incidence of misconception (Baker and Frank, 1964). The above format was approximately the same used in this study.

The Instrument

To measure the prevalence of certain nutrition misconceptions among adolescent girls in Oklahoma, a 70-item, "true"-"false"-"don't know" questionnaire (APPENDIX A) was used. It consisted of 55 false statements and 15 true statements. Seven areas of nutrition knowledge were presented in the test with 10 questions devoted to each area. The areas of nutrition knowledge were:

1. Health Foods;
2. Environmental Factors (food additives, pesticide residues, food processing, food enrichment);
3. Weight Control;
4. Nutrient Sources;
5. Nutrient Functions (and requirements);

6. Biological Processes (digestion, absorption, metabolism, and excretion);
7. Food Preparation (purchase and storage).

The order in which the 70 statements appeared on the questionnaire was randomized.

The questionnaire was developed and validated by McCarthy and Sabry (1973). They used it in a study to measure the prevalence of nutrition misconceptions among first year students at a Canadian university. Seventeen nutritionists from various professional and geographical areas in Canada reviewed the questionnaire for substantive validation. Reliability was tested by a pretest to determine the difficulty index of the questionnaire. The reliability coefficient was 0.59, obtained by the Kuder-Richardson 20 formula.

The Sample

A volunteer sample of adolescent females was sought in Oklahoma for a regional study entitled "Nutritional Health of Adolescent Females." Because a nutrition misconception test was designed into the regional study, this study was done in conjunction with the regional study and the sample population is the same, except this study includes additional girls who did not fit exactly in age ranges specified for the regional study. Biochemical analyses of blood and urine samples were a part of the regional study, and mothers and girls were interviewed separately. Because of these demands, a random sampling procedure was not attempted, as high response rate was unlikely. Voluntary or self-selection sampling was necessary in order to obtain enough adolescent girls willing to participate. One hundred and twenty-four girls participated in this study.

Several approaches were used in the recruitment of subjects. Some subjects were obtained through contact with home economics teachers and other contacts in the public school system. Girl Scouts and 4-H Club members were also informed of the study. The potential participants were contacted either in person or by letter. If the girl was interested, she gave her name, address, and phone number to one of the researchers who then called the girl's legal guardian to explain the study in more detail. When informed consent was given by a legal guardian, an appointment was made to interview that person, usually the girl's mother.

Administering the Questionnaire

During the study, several days, usually Saturdays, were designated as data collection days. On these days, 13 to 26 of the girls participating in the study came to a common location to bring urine samples, have blood drawn, be given a dental and a physical examination, and provide dietary and other information. It was at this time, usually while they were waiting to complete some of the other aspects of the study, that they made their responses on the questionnaire. Time was not a factor. Each girl was allowed all the time she needed to complete the questionnaire. When she recieved the questionnaire, instructions were given to:

> Read each statement carefully. If you think it is true, put a T; if you think it is false, put an F; and if you do not know, put a question mark. Do not guess. Answer it on your own and take your time.

If a girl asked a question about one of the statements, she was reminded to put a question mark if she did not understand a statement. The purpose of allowing a "don't know" response was so the respondent would

not guess and the researchers could differentiate between those who lacked knowledge concerning the statements and those who had misconceptions.

Scoring and Testing the Results

Three scores were determined for each girl on the questionnaire. If she answered "true" to a false statement or "false" to a true statement, she was said to have a misconception and this contributed to a misconception score. The test was also scored for number of correct answers and "don't know" responses. Each of the seven areas of nutrition knowledge was scored separately (APPENDIX B) so that the prevalence of misconceptions in each area could be obtained.

Analysis of the data was concerned with determining the percentage of nutrition misconceptions in each of seven subject matter areas, the percentage of adolescent females who believed each of the nutrition misconceptions, and the significant differences that occurred among the mean misconception scores of girls divided into groups according to grade level, race, locale, or related to mother's education level and per capita income. Significant differences in mean scores were determined by Duncan's Multiple Range Test and F tests from analysis of covariance. The 5 percent level of confidence was used to evaluate the results of these statistical tests. Standard deviations of mean scores were calculated. Statistical analyses were performed using GLM and Means procedures in The Statistical Analysis System (SAS) computer program (Helwig & Council, 1979).

CHAPTER IV

RESULTS

Description of Sample

The target population for this study was adolescent females in the central section of the state of Oklahoma. A description of the sample population appears in Table I. The sample consisted of 124 adolescent females, of whom 92 were white and 32 were black. The majority of both races came from urban area, as defined by this study.

TABLE I

DESCRIPTION OF THE SAMPLE OF ADOLESCENT FEMALES IN OKLAHOMA

Grade Category*	White		Black		Total
	Urban	Rural	Urban	Rural	
6	19	10	3	1	33
8	26	12	20	1	59
10	17	8	7	0	32
Total	62	30	30	2	124

*Grade 6=6; grades 7+8=8; grades 9+10+11=10.

To obtain valid results, it was necessary to develop grade categories because some of the individual school grade levels contained too few subjects to generalize findings to the target population. Categories are designated as grades 6, 8, and 10 because those were the actual grades from which the largest number of subjects came.

Mean Scores of the Total Sample

Table II lists the mean scores of the entire sample and the standard deviations for the 70-item nutrition misconception test. As a whole, the girls could not correctly answer 45 of the items, with more of these answers displaying a lack of knowledge rather than misconceptions (21) in the area of nutrition. They also possessed some knowledge (25) in the field.

TABLE II

MEAN SCORES AND STANDARD DEVIATIONS OF THE TOTAL SAMPLE ON THE 70-ITEM NUTRITION MISCONCEPTION TEST

Variable	Score	
	Raw	Percent
		%
Misconception	20.9 ± 7.7	29.8
Correct Answer	24.9 ± 8.8	35.6
"Don't Know"	24.3 ± 13.4	34.6

The misconception test was composed of seven subtopics of nutrition. Each subtopic was scored separately so that the prevalence of nutrition misconceptions in each area could be determined. Figure 1 illustrates the mean scores of the whole sample on these subtopics.

The area of the test that showed the most correct answers was Nutrient Sources with 5 of 10 items answered correctly. The largest proportion of misconceptions was seen in the areas dealing with Nutrient Functions and Biological Processes where 3.7 of 10 items were incorrectly answered. Health Foods was the subtopic that received the most "don't know" responses (5.1 of 10). The subtopics that elicited the highest number of items not answered correctly, with a total of 7.4 of 10 being missed in each group, were Health Foods and Biological Processes.

Mean Scores and Effects of Grade Level

The sample was divided into grade categories, as was shown in Table I, and the mean test scores and standard deviations were calculated by these categories. The results are reported in Table III.

General observation of the mean scores showed that sixth graders held the fewest misconceptions but also lacked the most knowledge and were unable to correctly answer 46.5 of the items. The misconception scores of the eighth and tenth grade groups were similar; however, a dissimilarity was seen between the two groups on the number of items not answered correctly, with the eighth grade group, on the average, not having answered correctly 45.7 items and the tenth grade group, 42.5 items.

The mean scores by grade categories for the entire misconception test and test subtopics were tested by the Duncan's Multiple Range Test to find any significant (0.05 level) differences among grades. Table IV displays the findings of the Duncan's test.

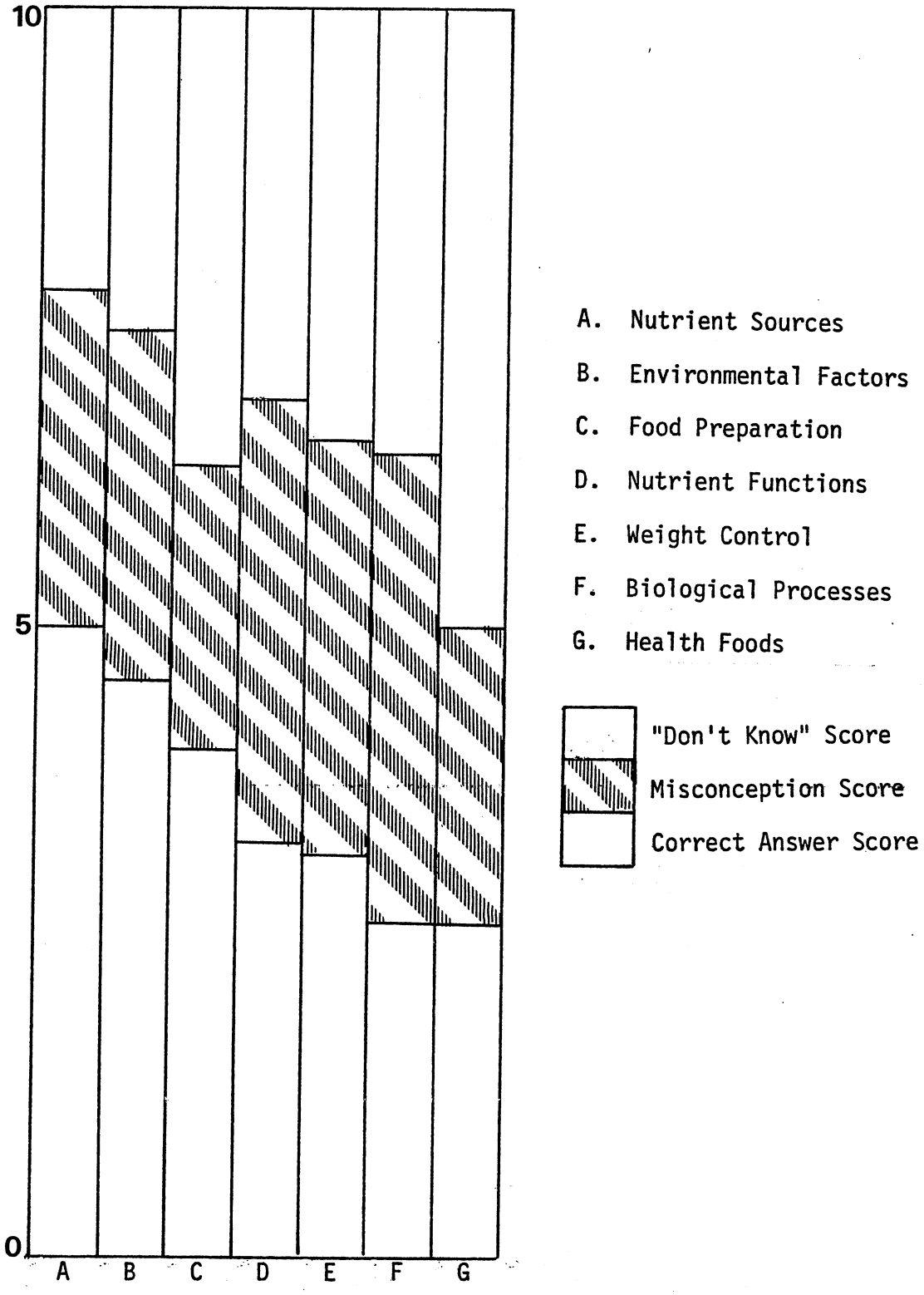

Figure 1. Mean Scores of the Total Sample on 10-Item Subtopics

TABLE III

MEAN RAW SCORES AND STANDARD DEVIATIONS BY GRADE CATEGORIES ON THE 70-ITEM NUTRITION MISCONCEPTION TEST

Variable	Grade 6	Grade 8	Grade 10
Misconception	19.7 ± 6.72	21.4 ± 8.38	21.1 ± 7.32
Correct Answer	23.5 ± 8.69	24.3 ± 9.36	27.5 ± 7.43
"Don't Know"	26.8 ± 13.40	24.3 ± 14.57	21.4 ± 10.92

Based on general examination of the means, the tenth grade group had the fewest incorrect answers on the entire test and on all subtopics, with the exception of the subtopic, Biological Processes, where mean scores for the eighth and tenth grade groups were the same and the mean score for sixth graders was the lowest.

Significant differences of the Duncan's test showed that grade level had an effect on the number of incorrect answers in the area dealing with Weight Control and Nutrient Sources. The tenth grade group had fewer incorrect answers in the area, Weight Control, than either of the other groups. They also had fewer incorrect answers in Nutrient Sources and more misconceptions in Biological Processes than sixth graders.

One objective of the study was to determine any differences in test scores due to rural or urban backgrounds of the subjects. Another objective of the study was to test for any differences among test scores

because of race. A problem arose in doing these analyses because only two black girls from a rural community volunteered for the study. Therefore, any differences seen between the scores from girls of rural backgrounds and ones from urban backgrounds could have really been due to the different racial makeup of subsamples, since almost all of the blacks came from an urban background. Likewise, a difference in scores supposedly due to race could have actually reflected rural or urban background.

TABLE IV

DUNCAN'S MULTIPLE RANGE TEST FOR MEAN SCORES BY GRADE CATEGORIES ON THE 70-ITEM NUTRITION MISCONCEPTION TEST

Topics	Misconception Score Grade			Total Missed Score* Grade		
	6	8	10	6	8	10
Entire test	19.7	21.4	21.0	46.5	45.7	42.5
Health Foods	1.9	2.6	2.1	7.2	7.6	7.1
Environmental Factors	3.0	2.9	3.3	5.9	5.7	5.1
Weight Control	3.0	3.6	2.9	7.3^{a**}	7.2^{a}	5.8^{b}
Nutrient Sources	3.0	2.4	2.5	5.7^{a}	4.8^{ab}	4.5^{b}
Nutrient Functions	3.2	3.8	4.0	6.9	6.8	6.6
Biological Processes	3.2^{a}	3.7^{ab}	4.1^{b}	7.0	7.6	7.6
Food Preparation	2.4	2.3	2.2	6.5	6.1	5.7

*Misconception score + "don't know" score = total missed score.
**Means for a score in a row of the table that have a common superscript or no superscript are not significantly different from each other.

Mean Scores and Effects of Race-Locale Groups

In an attempt to identify primary factors influencing test performance, the girls were grouped into four race-locale categories. These categories were described in Table I. The two Black-Rural girls were eliminated from the analysis. Mean scores and standard deviations for the three remaining groups were calculated and are reported in Table V.

TABLE V

MEAN RAW SCORES AND STANDARD DEVIATIONS BY RACE-LOCALE CATEGORIES ON THE 70-ITEM NUTRITION MISCONCEPTION TEST

Variable	White-Urban	White-Rural	Black-Urban
Misconception	21.2 ± 7.2	18.1 ± 8.8	22.3 ± 6.6
Correct Answer	25.4 ± 8.5	25.5 ± 9.5	22.8 ± 8.4
"Don't Know"	23.4 ± 12.8	26.4 ± 14.5	24.8 ± 13.2

According to these mean scores before satistical testing, the White-Rural group had the fewest nutrition misconceptions, followed by White-Urban, with Black-Urban possessing the most misconceptions. Black-Urban also had the fewest correct answers with a total of 47.2 of the items not answered correctly. Although the White-Rural group held the least misconceptions, they had the highest "don't know" response score and a total of 44.5 of the test items without correct responses.

All White-Urban scores were in between Black-Urban and White-Rural scores. The White-Urban group could not correctly answer 44.6 of the items.

The mean scores for race-locale groups on the entire test and test subtopics were tested by Duncan's Multiple Range Test. Table VI details the significant findings.

TABLE VI

DUNCAN'S MULTIPLE RANGE TEST FOR MEAN SCORES BY RACE-LOCALE CATEGORIES ON THE 70-ITEM NUTRITION MISCONCEPTION TEST

Topics	Misconception Score			Total Missed Score*		
	White		Black	White		Black
	Urban	Rural	Urban	Urban	Rural	Urban
Entire test	21.2^{ab}**	18.1^{a}	22.3^{b}	44.6	44.5	47.2
Health Foods	2.3	1.9	2.6	7.4	7.4	7.5
Environmental Factors	3.2	2.5	3.3	5.6^{ab}	5.0^{a}	6.2^{b}
Weight Control	3.4	2.8	3.3	6.7	6.9	7.1
Nutrient Sources	2.5^{a}	2.0^{a}	3.3^{b}	4.8	4.8	5.4
Nutrient Functions	3.7	3.5	3.9	6.8	6.8	6.9
Biological Processes	3.8	3.5	3.5	7.5	7.4	7.6
Food Preparation	2.4	1.9	2.4	5.9	6.2	6.4

*Misconception score + "don't know" score = total missed score.
**Means for a score in a row of the table that have a common superscript or no superscript are not significantly different from each other.

Results showed that the Black-Urban girls had the highest misconception score on the entire test, significantly higher than the White-Rural girls. The Black-Urban misconception score on Nutrient Sources was higher than either of the white groups' scores on this subtopic and the number of items the Black-Urban girls could not correctly answer on the subtopic, Environmental Factors, was significantly higher than the number not answered correctly by White-Rural girls.

Results of F Tests From Analysis of Covariance

F tests from analysis of covariance were used to examine the effect of grade level, race-locale, mother's education level and family per capita income on test scores and test subtopic scores. Results are presented in Table VII. Every socio-demographic characteristic tested exhibited some effect on some aspect of the misconception test. The effect of grade level on scores for test subtopics, Biological Processes, Nutrient Sources, and Weight Control, correspond to the findings of the Duncan's test. The areas of Weight Control and Nutrient Sources were the subtopics most strongly affected by grade level with a decrease in the total number of items missed as grade level increased. The race-locale groups had the greatest effect on subtopic test scores in the area, Nutrient Sources, with the Black-Urban girls having more misconceptions than the white groups. These groups also differed in the misconception score for the entire test and in the total number of items missed on the Environmental Factors subtopic with the Black-Urban group having the highest scores in both cases. These results correspond to the results obtained by the Duncan's test. Mother's education level showed an effect on the misconception score for Nutrient Sources. The misconception

TABLE VII

EFFECTS OF SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE SUBJECTS ON MEAN TEST SCORES ON THE 70-ITEM NUTRITION MISCONCEPTION TEST AND TEST SUBTOPICS

Variable(s) in each analysis	Misconceptions			Total Missed*			
	Entire Test	Nutrient Sources	Biological Processes	Entire Test	Nutrient Sources	Weight Control	Environmental Factors
Grade	---	---	.0541	---	.0441**	.0004	---
Race-locale	.0757	.0070	---	---	---	---	.0659
Mother's education	---	.0087	---	---	---	---	---
Grade	---	.1804	.0178	.1063	.0088	.0001	.0642
Race-locale	---	.0050	.3779	.0220	.0787	.1614	.0386
Grade	---	.2630	---	---	.0123	.0001	---
Race-locale	---	.0386	---	---	.1445	.1130	---
Mother's education	---	.0918	---	---	.3850	.1724	---
Per capita income	---	.6893	---	---	.8759	.6247	---

*Misconception score + "don't know" score = total missed score.
**Values with an underscore are significant at .05 level of confidence.

score decreased as mother's education level increased. Family per capita income exhibited some effect (P=.0474) on the number of misconceptions held in the area, Health Foods; as income increased, misconception scores decreased.

To eliminate biased results due to the effects of other variables on the variable being tested, some variables were tested together. The results are given in the lower half of Table VII.

When grade differences were eliminated, race-locale groups had a significant effect on the number of items not answered correctly on the entire test, a difference that was not apparent when race-locale groups were tested alone. The level of confidence was also increased for the effect of race-locale on items missed in the area, Environmental Factors, and misconceptions held in Nutrient Sources, when grade differences were considered. The effect of grade level increased on the misconception score for Biological Processes and on the number of items not answered correctly in the areas, Nutrient Sources and Weight Control, when the effect of race-locale groups was accounted for.

Grade level, race-locale, mother's education level and family per capita income were tested together to see which of these variables had the greatest effects on test and subtopic scores. With all other variables accounted for, mother's education level, and family per capita income did not significantly affect any of the test or subtopic scores. Grade level still had the greatest impact on items not correctly answered in the areas, Nutrient Sources and Weight Control. The effect of race-locale on misconceptions dealing with Nutrient Sources was still apparent but with a lesser degree of confidence.

The test was analyzed to determine the most frequently missed items, those most often answered correctly, and the items receiving the most "don't know" responses. These items are listed in Tables VIII, IX, and X. Figure 1 showed that Nutrient Sources was the area of the test with the most correct answers. This corresponds with the findings in Table IX in which 3 of the 5 items most frequently answered correctly were from this subtopic. Some relationship can also be seen between Figure 1 and Table X. Health Foods and Biological Processes were two areas of the test with high "don't know" response rates. Of the five items most frequently answered this way, four of them were from these two subtopics.

TABLE VIII

ITEMS MISSED MOST FREQUENTLY BY 124 ADOLESCENT FEMALES ON THE 70-ITEM NUTRITION MISCONCEPTION TEST

Item	Topic	Subjects with Misconception
		%
A well-trained athlete does not need more protein than a less active person of the same body weight, sex, race.	Nutrient Functions	73
Canned vegetable products have approximately the same nutritive value as fresh, cooked ones.	Environmental Factors	68
In the United States there is a complete listing of ingredients on all food labels.	Food Preparation	66
A calorie is a fatty substance found in food which causes weight gain.	Weight Control	65
A daily bowel movement is necessary for good health.	Biological Processes	64

TABLE IX

ITEMS MOST FREQUENTLY ANSWERED CORRECTLY BY 124 ADOLESCENT FEMALES ON THE 70-ITEM NUTRITION MISCONCEPTION TEST

Item	Topic	Subjects with Correct Answers
		%
The calcium in milk is not required by adults since their teeth and bone development is no longer in process.	Nutrient Functions	78
Expensive meats are more nutritious than inexpensive meats.	Food Preparation	75
In the United States, our only source of Vitamin C is oranges.	Nutrient Sources	74
Liver is our only food source of iron.	Nutrient Sources	71
It is possible to obtain all the nutrients we need by eating a wide variety of foods.	Nutrient Sources	68

TABLE X

ITEMS WITH THE MOST FREQUENT "DON'T KNOW" RESPONSES FROM 124 ADOLESCENT FEMALES ON THE 70-ITEM NUTRITION MISCONCEPTION TEST

Item	Topic	Subjects with "Don't Know" Responses
		%
"Acidosis" refers to digestive distress caused by certain foods.	Biological Processes	82
Taking a safflower oil capsule a day will lower blood cholesterol levels.	Health Foods	76
Vitamin E supplements enhance sexual potency in human beings.	Biological Processes	74
A little baking soda added to green vegetables while cooking will destroy vitamins in the vegetables.	Food Preparation	72
In the light of present day findings, the fat in one's diet should be polyunsaturated only.	Health Foods	65

CHAPTER V

DISCUSSION

The purpose of this study was to determine the prevalence of certain nutrition misconceptions among adolescent females in the central section of the state of Oklahoma. Critical deficiencies in the nutrition education of teenage girls in Oklahoma are suggested by results of this investigation. Not only did the subjects subscribe to a number of misconceptions (29.8 percent of test items) but they also possessed a high level of uncertainty (34.6 percent) with some knowledge in the field (35.6 percent). Other investigators of nutrition misconceptions have reported similar findings. Although it is not possible to compare the difficulty or relevance of items on various tests, similar scores in different studies tend to confirm each other, even though similar scores may not result when different tests are used.

Comparison of Scores with Other Studies

Wodarski (1976) tested the nutrition misconceptions of 185, 10-12 grade students. The mean misconception score for her total sample was slightly lower (26.6 percent) than the mean misconception score for this study, but Wodarski's subjects had more "don't know" responses (43 percent) and fewer correct answers (30.4 percent). McCarthy and Sabry (1973) tested 133 female, college freshmen with the same instrument used in this study. The misconception score of these subjects was slightly

lower (27.4 percent) than the misconception score of the girls in this study, but the "don't know" score was much lower (17.5 percent) and the correct answer score was noticeably higher (55.1 percent). This could be due to the increased exposure to nutrition information and subject matter as the girl progresses through school. In this study, as grade level increased, the number of correct answers increased and the number of "don't know" responses decreased. When this study's tenth grade group's mean scores are compared to their college freshmen's scores, the differences are considerably less than when the sixth graders' mean scores are compared to the college freshmen's scores.

Some of the items on the 70-item nutrition misconception test given to these adolescent girls have also appeared on other instruments to measure misconceptions of other groups. Table XI lists the items, subtopics, researchers, population samples, and misconception scores of those studies compared to this one. The large differences in scores on items from other studies and scores on some of the same items in this study, may be due to time-era differences. Misconceptions held by adolescents and youths in 1954 may still be present to some extent, but have probably been replaced with myths from more current times. Other explanations for differences in scores might be differences in grade levels, locations, and content and phrasing of items.

For this study, some difference was seen in the number of nutrition misconceptions subscribed to in various test subtopics. The area of the test with the lowest misconception score was Health Foods, which also had the highest number of "don't know" responses. These findings correspond directly to the findings of McCarthy and Sabry (1973), who also found the lowest misconception score and highest "don't know" responses

TABLE XI

COMPARISON OF THE MISCONCEPTION SCORES ON CERTAIN ITEMS FROM OTHER STUDIES AND THE MISCONCEPTION SCORE ON THE SAME ITEMS FOR THIS STUDY

Item	Researchers	Sample	Misconception Score	This Study's Score
			%	%
Spring water that is clear and cold is safe to drink. (Environmental Factors)	Dzenowagis and Irwin (1954)	grade 5	72	38
		grade 6	67	
	Harrison and Irwin (1964)	grades 7, 8, 9	58	
	Dzenowagis et al. (1954)	10th grade girls	60	
A daily bowel movement is necessary for good health. (Biological Processes)	Dzenowagis and Irwin (1954)	grade 5	59	64
		grade 6	68	
	Harrison and Irwin (1964)	grades 7, 8, 9	86	
	Dzenowagis et al. (1954)	10th grade girls	86	
	Synovitz (1960)	college level	77	
Once you stop exercising, muscle changes to fat. (Biological Processes)	Synovitz (1960)	college level	40	58
People with too much acid in their system should avoid all citrus fruit. (Biological Processes)	Synovitz (1960)	college level	34	52
Fish is a brain food. (Nutrient Functions)	Dzenowagis and Irwin (1960)	grade 5	42	13
		grade 6	44	
	Dzenowagis et al. (1954)	10th grade girls	38	

TABLE XI (Continued)

Item	Researchers	Sample	Misconception Score	This Study's Score
			%	%
Milk is a perfect food. (Nutrient Sources)	Harrison and Irwin (1964)	grades 7, 8, 9	80	48
An all vegetable diet is the natural and best diet. (Health Foods)	Dzenowagis and Irwin (1954)	grade 5	41	62
		grade 6	37	
	Harrison and Irwin (1964)	grades 7, 8, 9	37	
	Dzenowagis et al. (1954)	10th grade girls	26	

in the area, Health Foods. They reported the area with the fewest correct answers was Biological Processes. Biological Processes was also one of the two subtopics with the fewest correct answers in this study, the other subtopic being Health Foods. McCarthy and Sabry's (1973) subjects possessed the most misconceptions, the most correct answers, and the least "don't know" responses in the area, Environmental Factors. The subjects in this study had more correct answers in this subtopic than in five of the others and also had one of the lowest "don't know" response rates in this area. Their highest correct answer score was in Nutrient Sources. Wodarski (1976) found 33.5 percent misconceptions on the topic, "Foods My Body Needs," which can be compared to this study's subtopic, Nutrient Sources, which had a misconception score of 26 percent. The misconception scores on the topic, Weight Control, were almost the same for the two studies. The score in Wodarski's (1976) study was 32.1 percent compared to 33 percent for this study.

Hypothesis 1

The first hypothesis that was tested stated:

H_1: There will be no significant difference in the mean misconception scores among grade levels.

No significant differences were found among grade levels for the entire test; therefore, Hypothesis 1 is not rejected, for the test as a whole. Harrison and Irwin (1964) and Wodarski (1976) also found no significant differences among grade level scores. However, Synovitz (1960) found a significant difference in college levels, with college freshmen believing more misconceptions than sophomores, juniors, and seniors.

When the mean misconception scores by subtopics were tested, a significant difference among grade levels was found. The tenth grade group had more correct answers than the other two groups in the area, Weight Control. Wodarski (1976) also found a significant difference among grades on the subtopic, Weight Control. The tenth grade group had more correct answers in Nutrient Sources and more misconceptions in Biological Processes than sixth graders. These older girls may have absorbed more of the misinformation in this area because they have been exposed to more information in subject related classes and through the mass media. Hypothesis 1 is rejected for the subtopics, Weight Control, Nutrient Sources, and Biological Processes.

Hypotheses 2 and 3

Because only two black girls from a rural population volunteered for this study, Hypotheses 2 and 3 were tested together. They stated:

H_2: There will be no significant difference between the mean scores of whites and blacks.

H_3: There will be no significant difference in the mean scores received by girls from urban areas and girls from rural areas.

The Black-Urban group had significantly more misconceptions than the White-Rural group. They also appeared to subscribe to more misconceptions than the White-Urban group, but this difference was not significant. The difference in scores of Black-Urban and White-Rural seems to be associated more with race than with locale, but it is not possible to know definitely, since the difference in scores between the two urban groups was not significant. Synovitz (1960) found black college students possessed many more misconceptions (35.6 percent) than white

students (26.6 percent). He did not find a difference in the scores based on rural or urban background. Cornely et al. (1963) studied food and nutrition beliefs of 310 low-income black families and 98 low-income white families, both from an urban community. The level of nutrition knowledge was low for both groups, but 46.9 percent of the white families were considered to be informed in the area of nutrition, compared to 33.9 percent of the black families. McCarthy and Sabry (1973) did not test for race differences, but did test misconception scores for rural or urban differences, and found none.

When subtopic scores for the race-locale groups were compared, a significant difference was indicated. The Black-Urban group had more misconceptions in the area, Nutrient Sources, than either of the white groups. This difference can be attributed to race, since the two urban groups differed. The Black-Urban group had the least correct answers in the area, Environmental Factors, but they differed significantly from the White Rural group only.

Because it was necessary to make race-locale categories, significant findings cannot validly be distinguished as race differences and locale differences applicable to the whole population. Therefore, Hypotheses 2 and 3 were not completely tested. Hypothesis 2 can be rejected for urban girls in the area of Nutrient Sources, while Hypothesis 3 cannot be rejected for the white girls, for whom it could be tested.

Hypothesis 4

Hypothesis 4 stated:

H_4: There will be no relationship of the mean scores of girls to per capita income or mother's education level.

When mother's education level was tested alone, a significant effect was found on the subtopic, Nutrient Sources. As mother's education level increased, the number of misconceptions decreased. However, when grade level, race-locale, and per capita income were accounted for, mother's education level had no significant effect.

Similar results were seen when per capita income was tested. As income levels increased, the number of misconceptions in Health Foods decreased. However, when grade level, race-locale, and mother's education level were accounted for, per capita income made no significant difference. Therefore, Hypothesis 4 is not rejected.

Implications

Deficiencies in the nutrition education of teenage girls are suggested by results of this study and others (Wodarski, 1976; Dzenowagis and Irwin, 1954; Dzenowagis et al., 1954; Harrison and Irwin, 1964). Teenage girls should be provided with scientifically sound information on which to base their decisions regarding nutrition. The proliferation of misinformation and contradiction of scientific facts from a variety of sources could compound the problem of educating these girls as well as other age groups.

It is important to determine the topics in the area of nutrition where the teenager is misinformed in order to correct fallacies with facts. Recognition of the types of misconceptions held by teenage girls should enable educators to plan learning experiences to diminish these misconceptions. Therefore, an assessment of the teenager's present knowledge and areas of high misconceptions should precede the initiation of any nutrition education program for adolescents. In the words of

Dwyer et al. (1970)

> . . . nutritionally illiterate adolescents soon become nutritionally illiterate adults and the improvement of nutrition education in the schools seems to be a most sensible and economical means of intervening in the cycle (p. 66).

Suggestions for Further Research

On the basis of the findings of this study, the following questions are suggested as objectives for further study:

1. Misconception scores increased in some subtopic areas as grade level increased. Where are teenage girls exposed to nutrition misconceptions?
2. Correct answer scores on certain subtopic areas increased as grade level increased. Where are teenage girls exposed to sound nutrition information?
3. Girls had more misconceptions in some subtopic areas than in others. What areas of nutrition are being taught in schools and are they the most important areas for this age group?
4. Black-Urban girls had more misconceptions than White-Rural girls. Would Black-Rural girls have more misconceptions than White-Rural girls?
5. There were no significant differences between the scores of White-Urban and those of White-Rural girls. Would scores of Black-Urban girls differ from those of Black-Rural girls?
6. Mother's education level had no effect on test scores. If mothers took the test, how would their scores compare to their daughters' scores?

CHAPTER VI

SUMMARY

The purpose of this study was to determine the prevalence of certain nutrition misconceptions among adolescent females in the central section of the state of Oklahoma. A 70-item, "true"-"false"-"don't know" questionnaire was administered to 124 girls, between the ages of 11.5 and 16.5 years. The test was divided into seven subtopic areas; Health Foods, Environmental Factors, Weight Control, Nutrient Sources, Nutrient Functions, Biological Processes, and Food Preparation. The subjects were divided into two subgroup categories; grade level (6, 8, 10) and race-locale groups (White-Urban, White-Rural, Black-Urban).

It was the intent of this study to test the following null hypotheses:

H_1: There will be no significant difference in the mean misconception scores among grade levels.

H_2: There will be no significant difference between the mean scores of whites and blacks.

H_3: There will be no significant difference in the mean scores received by girls from urban areas and girls from rural areas.

H_4: There will be no relationship of the mean scores of girls to per capita income or mother's education level.

Mean scores of the total sample and subgroup categories for the entire test and test subtopics were tested by analysis of variance, Duncan's Multiple Range Test, and F tests from analysis of covariance.

The .05 level of confidence was used.

Results showed that the sample of adolescent females in Oklahoma did subscribe to many nutrition misconceptions and had a low level of nutrition knowledge. The girls appeared to possess more knowledge and fewer misconceptions on certain subtopic areas than on others. Nutrient Sources had the most correct answers and Health Foods had the fewest misconceptions, with the most "don't know" responses.

When test scores were examined for grade level differences, no significant difference was found for the entire test; however, as grade level increased, the number of correct answers generally increased and "don't know" responses decreased. A significant difference was found among grade levels for some subtopic scores. The tenth grade group had more correct answers in the area, Weight Control, than the other two groups, and more correct answers in the area of Nutrient Sources, than sixth graders. They also had more misconceptions in the area Biological Processes, than the sixth grade girls.

A significant difference in overall test scores was found when race-locale groups were compared. The Black-Urban girls had more misconceptions than the White-Rural girls. On subtopic scores, the Black-Urban group held more misconceptions in Nutrient Sources than either of the white groups. They also had fewer correct answers in the area, Environmental Factors, than the two white groups, but the difference was significant only for the White-Rural group.

Misconception scores were tested for differences due to per capita income and mother's education level. When differences due to other variables were accounted for, no effects were found.

SELECTED BIBLIOGRAPHY

Axelson, J. M. and Del Campo, D. S.: Improving teenagers' nutrition knowledge through the mass media. J. Nutr. Educ. 10:30, 1978.

Baker, B. and Frank, J.: A new approach in determining health misconceptions. J. Sch. Health 34:300, 1964.

Baird, J.: Nutrition Education A Needs Assessment For Oklahoma. Stillwater: Oklahoma State University, 1979.

Bowden, N. J.: Food patterns and food needs of adolescents. J. Sch. Health 43:165, 1973.

Brent, C.: TV commercials can teach nutrition. J. Home Econ. 66:21, 1974.

Cornely, P. B., Bigman, S. K., and Watts, D. D.: Nutritional beliefs among a low-income urban population. J. Am. Dietet. A. 43:131, 1963.

Dwyer, J. T., Feldman, J. J., and Mayer, J.: Adolescent dieters: who are they? Am. J. Clin. Nutr. 20:1045, 1967.

Dwyer, J. T., Feldman, J. J., and Mayer, J.: Nutrition literacy of high school students. J. Nutr. Educ. 2:59, 1970.

Dzenowagis, J. G. and Irwin, L. W.: Prevalence of certain harmful health and safety misconceptions among fifth and sixth grade children. Res. Quart. 25:150, 1954.

Dzenowagis, J. G., McPherson, P. V., and Irwin, L. W.: Harmful health and safety misconceptions of a group of tenth grade girls. J. Sch. Health 24:240, 1954.

Edwards, C. H., Hogan, G., Spahr, S., and Guilford County Nutrition Committee: Nutrition survey of 6200 teen-age youth. J. Am. Dietet. A. 45:543, 1964.

Everson, G. J.: Bases for concern about teenagers' diets. J. Am. Dietet. A. 36:17, 1960.

Finkelstein, J.: "Nutritional Risk Factors in Adolescence." "Teenage Sexuality: Pregnancy, Birth Control, and Abortion." "Teenage Nutrition: Threat or Threshold to a Healthy Adult Life?" Sponsored by Vitamin Nutrition Information Service. New York, N.Y., June 12, 1981.

Greger, J. L., Higgins, M. M., Abernathy R. P., Kerksey, A., DeCorso, M. B., and Baligar, P.: Nutritional status of adolescent girls in regard to zinc, copper, and iron. Am. J. Clin. Nutr. 31:269, 1978.

Gregory, J. C.: A study of the food group distribution patterns of children, grades 7-12. Unpublished M.S. thesis, Oklahoma State University, 1982.

Haider, S. Q. and Wheeler, M.: Dietary intake of low socioeconomic black and Hispanic teen-age girls. J. Am. Dietet. A. 77:677, 1980.

Harrison, P. E. and Irwin, L. W.: Certain harmful health misconceptions of junior high school students attending public schools in metropolitan areas. Res. Quart. 35:496, 1964.

Hinton, M. A., Eppright, E. S., Chadderdon, H., and Wolins, L.: Eating behavior and dietary intakes of girls 12 to 14 years old. J. Am. Dietet. A. 43:223, 1963.

Helwig, J. T. and Council, K. A.: SAS User's Guide. Raliegh: SAS Institute Inc., 1979.

Howe, S. M. and Vaden, A. G.: Factors differentiating participants and non-participants of the National School Lunch Program. J. Am. Dietet. A. 76:451, 1980.

Johnson S. D. and Hart, E. J.: Nutrition misconceptions. Health Educ. 8:36, 1977.

Leverton, R. M.: The paradox of teen-age nutrition. J. Am. Dietet. A. 53:13, 1968.

MacKenzie, L. and Arbor, E.: Cross-age teaching - an important concept for nutrition education. J. Nutr. Educ. 2:138, 1979.

MacReynolds, J. P.: Can teaching good nutrition be bad? J. Nutr. Educ. 2:13, 1970.

McCarthy, M. E. and Sabry, J. A.: Canadian university students' nutrition misconceptions. J. Nutr. Educ. 5:193, 1973.

Osman, J. D.: Nutrition education: too much, too little or too bad? J. Sch. Health 42:592, 1972.

Parks, M. P.: Effects of nutrition education on nutritional knowledge and food preferences of adolescents. Unpublished M.S. thesis, Texas Women's University, 1977.

Preliminary Findings of the First Health and Nutrition Examination Survey, United States, 1971-1972 (Dietary Intake and Biochemical Findings). DHEW Publ. No. (HRA) 74-1219-1, 1974.

Schorr, B. C., Sanjur, D., and Erickson, E. C.: Teen-age food habits, a multidimensional analysis. J. Am. Dietet. A. 61:415, 1972.

Schwartz, N. E.: Nutritional knowledge, attitudes and practices of high school graduates. J. Am. Dietet. A. 66:28, 1975.

Schwartz, N. E., Dalrymple, J. L., and Vivian, V. M.: High School nutrition education: how effective is it? J. Home Econ. 66:16, 1974.

Synovitz, R. J.: Use of harmful health misconceptions as a basis for selection of subject matter areas and course content in college health classes. Res. Quart. 31:650, 1960.

Thomas, J. A. and Call, D. L.: Eating between meals - a nutrition problem among teenagers? Nutr. Rev. 31:137, 1973.

Weigley, E. S.: The pregnant adolescent. J. Am. Dietet. A. 66:588, 1975.

Wodarski, L. A.: Food and nutrition misconceptions, knowledge related interests and information sources of Knoxville, Tennessee high school students. Unpublished Ph.D. dissertation, University of Tennessee, 1976.

Wodarski, L. A., Adelson, O. L., Todd, M. T., and Wodarski, J. S.: Teaching nutrition by teams-games-tournaments. J. Nutr. Educ. 12:61, 1980.

APPENDIXES

APPENDIX A

NUTRITION MISCONCEPTION TEST

NUTRITION INFORMATION QUESTIONNAIRE

(Adapted from McCarthy & Sabry, 1973)

1. Margarine contains fewer calories than butter.
2. Insecticide residues are completely removed when fruits and vegetables are washed in water.
3. Frozen orange juice is just as nutritious as fresh orange juice.
4. Yogurt contains practically no calories.
5. Polyunsaturated fats are lower in calories than saturated fats.
6. Even if one eats a wide variety of foods, it is necessary to take a vitamin supplement at least every other day.
7. Vegetable juices are more nutritious than the same amount of the vegetables themselves.
8. Mothers should "eat for two" during pregnancy.
9. Vitamin E supplements enhance sexual potency in human beings.
10. A little baking soda added to green vegetables while cooking will destroy vitamins in the vegetables.
11. Brown rice is often cheaper than white rice.
12. Bran cereals are necessary to regulate the excretion of body wastes.
13. The natural sugars in honey are less fattening than refined sugars.
14. Eating garlic will reduce high blood pressure.
15. Foods grown on depleted soils are low in vitamins.
16. Most of our food is not safe to eat.
17. High protein foods such as meat and fish contain practically no calories.
18. Most of the nutrients in apples are directly under the skin.
19. It is possible to obtain all the nutrients we need by eating a wide variety of foods.
20. "That tired feeling" is most likely due to lack of iron.
21. Meat is not essential for an adequate diet.

22. Expensive meats are more nutritious than inexpensive meats.

23. A daily bowel movement is necessary for good health.

24. High intakes of certain vitamins may be harmful.

25. A vinegar and honey mixture has special curative powers.

26. White bread is not a nutritious food.

27. In the United States, food additives are checked by the Food and Drug Administration before they are permitted to be added to foods.

28. The calorie requirement of the body is greatly increased by mental work.

29. Melba toast contains no calories.

30. Enriched white bread has iron and B vitamins added.

31. The calcium in milk is not required by adults since their teeth and bone development is no longer in process.

32. A well-trained athlete does not need more protein than a less active person of the same body weight, sex, age.

33. Prolonged cooking of vegetables in large amounts of water removes some of the vitamin-mineral value.

34. The food in cans which are blown or pushed out at the ends may be harmful if consumed.

35. "Acidosis" refers to digestive distress caused by certain foods.

36. The higher cost of organic eggs in health food stores is offset by their special health-giving properties.

37. Taking a safflower oil capsule a day will lower blood cholesterol levels.

38. Canned vegetable products have approximately the same nutritive value as fresh, cooked ones.

39. One should avoid eating all fish because of its mercury content.

40. Alcohol contains no calories because it is not a food.

41. Raw eggs are more nutritious than cooked eggs.

42. In the light of present day findings, the fats in one's diet should be polyunsaturated only.

43. Girls need more iron than boys.

44. Home cooked foods are always more nutritious than foods bought in student dining halls.

45. Once a person stops exercising, muscle fibers change to fat.

46. Fish and milk eaten at the same meal cause indigestion.

47. An all vegetable diet is the surest way to good health.

48. Processed breakfast cereals contain practically no food value.

49. Wheat germ contains nutrients not found in any other foods.

50. Milk contains all the essential elements of a good diet.

51. Pizza is a nutritious food.

52. Fish has a stimulating effect on brain tissue.

53. The term "enriched" refers to the amount of butter, eggs and milk in a product.

54. Green glass jars keep food from spoiling.

56. Eating yogurt prolongs life.

57. Gelatin capsules dissolved in orange juice will strengthen finger nails.

58. Organic food is grown completely free from contact with chemicals.

59. Spring water that is clear and cold is safe to drinking.

60. Grapefruit can assist in burning up fat.

61. In the United States, our only source of Vitamin C is oranges.

62. When foods are boxed or packaged, they are often more expensive.

63. Sour fruits like lemons, oranges and tomatoes do not cause acid stomach.

64. Cheese is hard to digest.

65. Liver is our only source of iron.

66. Vitamin C prevents colds.

67. In the United States, there is a complete listing of ingredients on all food labels.

68. People with too much acid in their system ought to avoid citrus fruit.

69. A calorie is a fatty substance found in food which causes weight gain.

70. Obesity is usually hereditary in adults.

APPENDIX B

KEY FOR SCORING TEST BY SUBTOPICS

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Health Foods

13. F
14. F
25. F
36. F
37. F
42. F
47. F
56. F
57. F
58. F

Environmental Factors

2. F
3. T
15. F
16. F
26. F
27. T
38. T
39. F
48. F
59. F

Weight Control

1. F
4. F
5. F
17. F
28. F
29. F
40. F
60. F
69. F
70. F

Nutrient Sources

6. F
7. F
18. F
19. T
30. T
41. F
50. F
51. T
61. F
65. F

Nutrient Function

8. F
9. F
20. F
21. T
31. F
32. T
43. T
49. F
52. F
66. F

Biological Processes

12. F
23. F
24. T
35. F
45. F
46. F
55. F
63. T
64. F
68. F

Food Preparation

10. T
11. F
22. F
33. T
34. T
44. F
53. F
54. F
62. T
67. F

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